Patent Claims

1. A heat exchanger, in particular an evaporator for air-conditioning systems in motor vehicles, having a number of heat transfer surfaces made from metal, in particular aluminum or aluminum compounds, to which a plurality of layers have been applied, nanoparticles being used for the coating.

2. The heat exchanger as claimed in claim 1, in which each layer contains nanoparticles of different compositions.

3. The heat exchanger as claimed in claim 1 or 2, in which at least one layer has corrosion-resistant properties and at least one further layer, preferably arranged thereon, has hydrophilic properties.

4. The heat exchanger as claimed in claim 3, in which the layer with hydrophilic properties has a wetting contact angle with water of less than or equal to 60°, preferably of less than or equal to 40°.

5. The heat exchanger as claimed in one of claims 1 to 4, in which the nanoparticles of organic and/or inorganic compounds of aluminum, silicon, boron and/or transition metals, preferably from transition groups IV and V of the periodic system, and/or cerium dissolved and/or dispersed in inorganic and/or organic solvents are used for the coating.

6. The heat exchanger as claimed in one of claims 1 to 5, in which each layer thickness amounts to less than 1.5 µm or equal to 1.5 µm, preferably less than 1 µm or equal to 1 µm, and in which the total layer thickness amounts to less than 5 µm or equal to 5 µm.

7. A process for the surface treatment of heat exchangers, in particular as claimed in one of claims 1 to 6, in which a plurality of layers are applied to a number of heat transfer surfaces made from metal, in particular aluminum or aluminum compounds, with nanoparticles being used for the coating.

8. The process as claimed in claim 7, in which the nanoparticles of organic and/or inorganic compounds of aluminum, silicon, boron and/or transition metals, preferably from transition groups IV and V of the periodic system, and/or cerium dispersed and/or dissolved in inorganic and/or organic solvents are used for the coating.

9. The process as claimed in claim 7 or 8, in which the layers are applied by dipping, flooding or spraying, with the individual layers being applied in direct succession without any intermediate drying.

10. The process as claimed in claim 7 or 8, in which the layers are applied by dipping, flooding or spraying, with the individual layers being applied in separate treatment steps in each case with intermediate drying.